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USDA ■ Forest Service

## forest insect & disease management methods application group

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### NEWSLETTER

CATALOGING = PREP.

#### HIGH ALTITUDE PHOTOGRAPHY FOR BARK BEETLE SURVEYS

High resolution color infrared (SO-131) photography may be an alternative to aerial sketch mapping for stratification of bark beetle infestations, the first stage of a multistage sampling system for estimating annual losses. A pilot study is currently underway to compare two camera formats, panoramic (KA80A optical-bar) and 9 x 18-inch (HR-732), for detection of single- and group-killed trees and stratification of infestation levels at a scale of 1:30,000. This study is a cooperative effort involving Forest Insect and Disease Management (FI&DM) staffs in Forest Service Regions 1, 2, and 5; MAG; the California Department of Forestry; National Forestry Applications Project, Houston; the Washington Office Engineering staff; and NASA Ames Research Center, Moffett Field, California.

Both formats of photography will be compared to large scale (1:8000) color IR photographs taken at approximately the same time. Ground truth acquisition will be underway as soon as photos are indexed and interpreted. Photography was taken by two NASA U2 aircraft on April 22, 1978. The test site includes a 4400 square mile portion of the west slope of the Sierra Nevadas, currently suffering from a drought-related bark beetle outbreak.

If one of these camera formats proves to be a workable sampling or stratification tool, it will be used in conjunction with multistage surveys planned for this summer in the Gallatin, Beaverhead, and Lewis and Clark National Forests in Montana, and the Black Hills National Forest in South Dakota and Wyoming.

#### MOUNTAIN PINE BEETLE LOSS SURVEYS

The Mountain Pine Beetle Damage Survey Working Group met in Davis in March to review problems and results of the 1977 multistage surveys conducted on the Targhee National Forest in Idaho and the Black Hills National Forest in South Dakota and Wyoming. The Group also developed plans for follow-up work in 1978. Forest Service personnel from several western Regions, the Pacific Southwest Forest and Range Experiment Station, and the Washington Office Engineering staff participated.

The principal subject discussed was survey design. Design of 1978 surveys will be similar to that used during 1977, with modifications to increase precision of estimates. Differences include an increased number of ground truth plots, the system of plot selection (probability proportion to size rather than random selection), and the method of initial stratification. An alternative method

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of stratification may be the use of high elevation color IR photography described in the preceeding section. Last year's surveys were stratified by aerial sketch mapping, and although the technique was successful, it was highly subjective and time consuming.

#### WORK ON COMPUTERIZED MAPPING CONTINUES

Considerable progress is being made in evaluation of geographic information systems for analysis, display, storage, and retrieval of data on forest insects and diseases. MAG recently learned of a system developed by COMARC Design Systems of San Francisco, a consulting firm active in development of planning and resource management data base systems. This system has the ability to encode, store, and display geographic data directly from source maps. It provides a wide range of data manipulations and statistical analysis outputs. Both polygon and grid format output options are available.

MAG has arranged for a demonstration of the COMARC System. Aerial sketch map data from the Targhee and Black Hills National Forests are now being digitized for the demonstration which is being coordinated with the Geometronics group of Washington Office Engineering staff, the group assigned responsibility for implementation of a National Geographic Data Base System. In addition, Regions 1 and 6 are continuing to evaluate PLOT, a polygon system developed by Region 6.

A working group will be organized to ensure that user requirements of geographic data base systems are met.

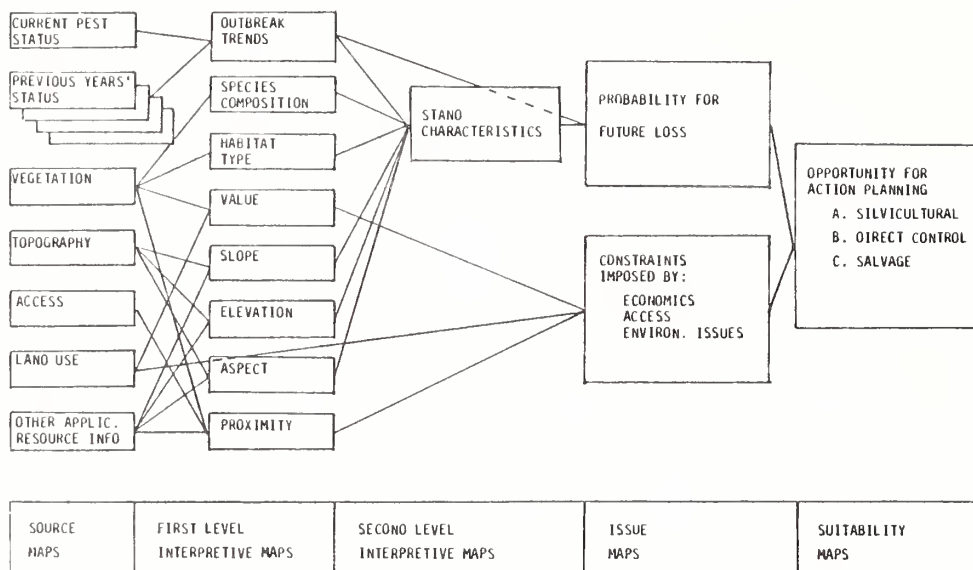
#### COMPUTERIZED MAPPING FOR INTEGRATION OF RESOURCE INFORMATION

Bob Young recently attended a seminar sponsored by COMARC Design Systems on application of a geo-based information system. The seminar was oriented toward the use of geo-based systems for integrating resource information from many sources for decision making. Some of the concepts discussed in the seminar are worthy of mention in this newsletter as we continue to report progress on the development of these systems.

Outputs of a geo-based information system have much greater potential in forest insect and disease management than simply a display of infestation boundaries of major insect and disease pests. For maximum utility, data on status of insects and diseases and losses incurred must be a layer in a much larger information system. It can be then integrated with other information layers, such as soil types, vegetation, topography, access, etc., to maximize assessment of management alternatives and arrive at sound decisions regarding prevention and control of forest insect and disease pests.



PLANNING SCENARIO FOR INTEGRATING INSECT AND DISEASE SURVEY DATA  
WITH OTHER RESOURCE INVENTORIES USING COMPUTERIZED MAPPING AS A TOOL



## DWARF MISTLETOE LOSS ASSESSMENT

The Dwarf Mistletoe Loss Assessment Working Group met in January and reviewed results of surveys conducted in 1977. There was general agreement within the Group that data from timber inventories of the Prescott National Forest, Arizona, and the Medicine Bow National Forest, Wyoming, indicate that inventory data, in present form, is not a good data source for estimating insect and disease loss. However, timber inventories are still considered an alternative way to collect data on losses associated with pathogens such as the dwarf mistletoes, once data collection procedures are strengthened.

MAG will continue to work with the Timber Management Planning Group and Forest Survey to improve quality of insect and disease data collected during resource inventories. In the interim, each Region has been asked to provide an interim update of dwarf mistletoe losses in 1978, based on existing sources of data.

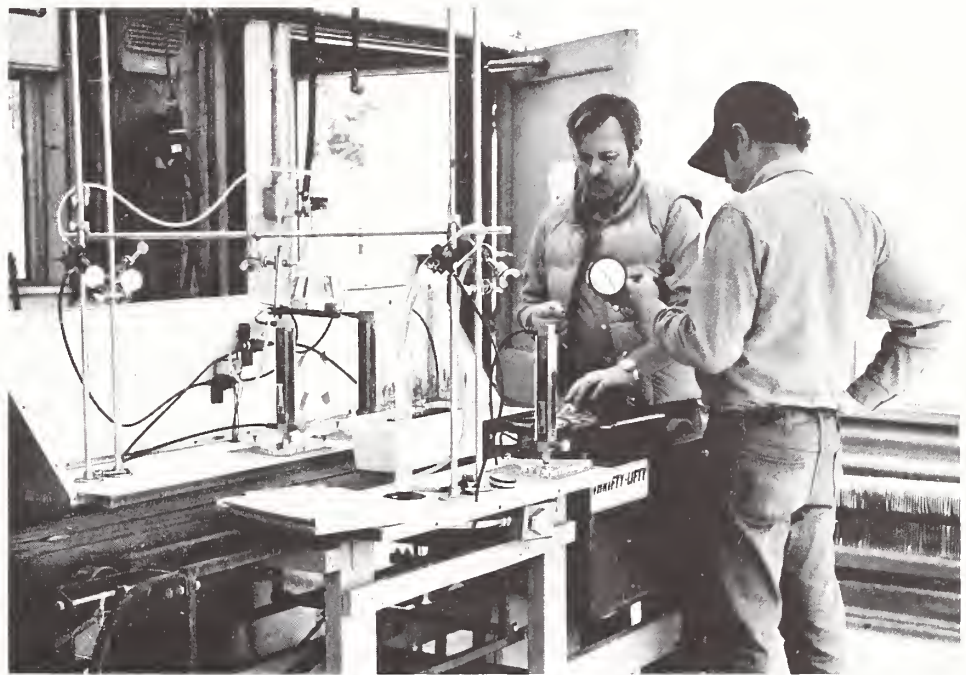
## FUSIFORM RUST SUSCEPTIBILITY TESTING

A center to screen susceptibility of southern yellow pine seedlings to the fusiform rust fungus was established several years ago at the Bent Creek Experimental Forest near Asheville, North Carolina, by the Southeastern Area. Screening results have been more varied than anticipated, and it has been suggested that the method of applying fusiform rust spore suspensions to test seedlings may be partially responsible. Dave Drummond and Jack Barry of MAG recently worked with Bob Anderson and Susan Hubbard of the Fusiform Rust Screening Center to compare a new commercial spray nozzle for applying spore suspensions to pine seedlings with custom-made nozzles presently used. Preliminary evaluation of deposits on seedlings sprayed with a red dye indicate that the commercial nozzles could produce much smaller droplets than the custom nozzle. The Center is assessing spray deposits on foliage to determine number and size of spray droplets. This assessment



will make it possible to estimate spore dosage per seedling. Results should provide more consistent exposure of seedlings to spore suspensions and more reliable data on southern yellow pine seedling susceptibility to fusiform rust.

*Evaluating performance of nozzles to apply fusiform rust spores. (L-R) John Knighton, Bob Wolfe.*



#### SPRAY CHARACTERIZATION OF MARSH TURBO THRUSH

In recent years application of pesticides in mountainous terrain of the western United States has been done almost exclusively by helicopters because they can maneuver effectively in steep terrain, spray close to the forest canopy, and operate out of remote heliports, thus reducing ferry time. Cost of helicopter application is expensive, however, and significantly increases cost of pesticide application.

MAG recently learned of the existence of the Marsh Turbo Thrush, an agricultural aircraft used in crop spraying. The Turbo Thrush is equipped with a Garrett TPE 331 turbine engine installed by Marsh Aviation of Mesa, Arizona. This modification increases aircraft performance and thus the Turbo Thrush has the potential for treating steep mountainous terrain previously believed to be restricted to helicopter treatment.

During late February, Jack Barry and Lynne Whyte, working with representatives of the Pacific Southwest Forest and Range Experiment Station, Forest Service Region 3, Missoula Equipment Development Center, the Arizona and New Mexico Divisions of Forestry, and Marsh Aviation conducted preliminary aircraft characterization trials of the Turbo Thrush near Mesa. The purpose of these trials was to determine swath width and droplet deposition characteristics of two materials commonly used in forest spraying, Sevin 4-oil and Thuricide 16B, a commercial preparation of the bacterium Bacillus thuringiensis. These data are currently being analyzed and results will be issued as a special FI&DM/MAG report. Preliminary observations were impressive. The droplet spectrum was narrow with high droplet density.

Plans are currently being made to evaluate performance of this aircraft in mountainous terrain this summer in cooperation with Forest Service Region 4 in central Idaho.

#### TRANSLATION SERVICES AVAILABLE

FI&DM/MAG recently learned of a service available for translating scientific literature into and from foreign languages. This service is available to Federal agencies through the Technical Translation Division-Foreign Technology Division, Wright-Patterson Air Force Base, Ohio, 45433. We have used this service to translate several papers on pesticide application technology which appeared in Russian literature.



*Marsh Turbo Thrush  
(Photo courtesy of  
Marsh Aviation,  
Mesa, Arizona).*



## PEOPLE, PUBLICATIONS, AND PAPERS

Phil Thornton, Associate Deputy Chief for State and Private Forestry, U.S. Forest Service, Washington, D.C., spent a day with the FI&DM/MAG staff during March for briefing on the unit's mission and accomplishments to date. This was Phil's first visit to MAG since the unit was established in 1975.

Brian Young, a chemist with ICI Ltd. in Great Britain, visited MAG during March 1978 as part of a tour of organizations in the United States engaged in work in pesticide application technology. Brian is presently working on techniques for sizing spray droplets of pesticide formulations, and studying their behavior and mode of action on leaf surfaces.

Dave Grimble, MAG entomologist, has transferred to Broomall, Pennsylvania, to assume duties of Applications Coordinator of the CANUSA Spruce Budworms East Research and Development Program.

Cathy Haider has joined the MAG staff as part-time clerk typist. Cathy is from Woodland, California, where she previously worked for the California State Farmers Home Administration.

Bill Ciesla has been appointed to the Technical Review Panel of the CANUSA Spruce Budworms West Research and Development Program.

Bill Klein and Bill Ciesla recently served as workshop chairmen for the Western Forest Insect Work Conference in Durango, Colorado. Bill headed up a workshop on impact surveys and Bill Ciesla chaired a session entitled "FI&DM/MAG--Purpose and Accomplishments."

Bob Young presented a paper entitled "Future System Needs: FI&DM Perspective" at the U.S. Forest Service Systems Management Policy Workshop, Denver, Colorado, during February 1978.

Bill Klein presented a paper entitled "Multistage Air Photo Assessment For Annual Losses Caused By The Mountain Pine Beetle In Lodgepole Pine" during February at a Symposium on Remote Sensing For Vegetation Damage Assessment in Seattle, Washington.

A paper entitled "Approaches to Determining Volume Losses on a Westwide Basis" was presented at a Symposium on Dwarf Mistletoe Control Through Forest Management by Dave Drummond. Dave also served as general secretary of this symposium, which was sponsored by the Pacific Southwest Forest and Range Experiment Station and the College of Natural Resources, University of California at Berkeley.

Dave Drummond, together with Ronald G. Pearson, Ontario Ministry of the Environment, presented a paper entitled "The Development of Studies to Screen Plant Populations" at a specialty Conference on Methodology for the Assessment of Air Pollution Effects on Vegetation, sponsored by the Upper Midwest Section of the Air Pollution Control Association in Minneapolis, Minnesota, April 20, 1978.

## PUBLICATIONS

Ciesla, W.M. 1977. Color versus color IR photos for forest insect surveys. Proceedings of the Sixth Biennial Workshop--Aerial Photography In The Plant Sciences and Related Fields, Colorado State University, Fort Collins, Colorado, August 9-11, 1977. pp. 31-42.



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